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| 10/672,796 | 09/26/2003 | Andrew Morgan | TRAN-P162 | 9469 |

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| EXAMINER |
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PICH, PONNOREAY

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| ART UNIT | PAPER NUMBER |
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2135

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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| 3 MONTHS | 02/26/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/672,796

Applicant(s)

MORGAN ET AL.

Examiner

Ponnoreay Pich

Art Unit

2135

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 10/03
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Claims 1-26 have been examined and are pending.

Information Disclosure Statement

The documents listed in the IDS submitted on 10/20/2003 have been considered.

Claim Objections

Claim 1 is objected to because of the following informalities:

1. "said internal memory coupled to said cryptography engine" in the last two lines of claim 1 should be deleted as what is recited therein is redundant.
2. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7, 9-11, 14, 21, and 23-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Okada (US 6,704,872).

Claim 1:

Okada discloses:

1. A digital secret that comprises a secret key used in a key-based cryptographic process, wherein said digital secret is internally accessible only within said

processor (col 11, lines 8-10, 23-28; col 9, lines 31-36; and col 12, lines 15-19, 60-65). *The secret key and the private key stored in the processor can both be considered the digital secret or at least part of the digital secret. The processor id 16 can also be considered part of the digital secret or by itself the digital secret since an authenticated processor id allows a program to be executed by a processor (col 12, lines 20-30), thus the processor id acts as a "secret key" for allowing program execution.*

2. A cryptographic engine for performing said key-based cryptographic process internally within said processor, said cryptography engine coupled to said digital secret (Fig 1, item 17; Fig 5, item 17; col 10, lines 15-19 and lines 46-49).
3. Internal memory, i.e. ROM 14 and registers of processor 100, coupled to said cryptography engine for supporting said key-based cryptographic process (Fig 1, item 14; Fig 5, item 14; col 8, lines 26-35; col 11, lines 1-22; and col 12, lines 35-59). *Note the memory which is used to store either the secret key or the public/private key pair used by the encryption/decryption unit 17 can also be considered the internal memory or part of the internal memory.*

Claim 2:

The limitation of an internal bus for facilitating secure communication between said cryptography engine, said digital secret, and said internal memory within said processor is inherent to Okada's invention because Okada discloses that the authentication procedure according to his invention is executed totally invisibly from external program (col 11, lines 23-28). This means that for each of the functional units

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seen in processor 100 of Figures 1 and 5 to be able to perform authentication via the program codes discussed by Okada (col 11, lines 1-22 and col 12, lines 35-59), an internal bus is needed to connect each of these functional units to facilitate secure communication between the units so that an external program cannot observe what is happening within the processor 100.

Claim 3:

Okada discloses wherein said digital secret is securely confined within said processor (col 11, lines 23-28 and col 12, lines 60-65). An external program cannot view the authentication procedure by processor 100 which uses either the secret key or the private key, thus the key, i.e. digital secret, is securely confined within said processor.

Claim 4:

Okada further discloses wherein said internal memory, i.e. ROM 14 and registers of processor 100, comprises: microcode for implementing said key-based cryptographic process on data within said processor (col 8, lines 26-35).

Claim 5:

Okada further discloses wherein said internal memory securely stores intermediate data created within said key-based cryptographic process (col 8, lines 26-35; col 11, lines 1-29; and col 12, lines 35-59).

The cited section in column 8 discusses how ROM 14 stores microcode executed by the processor and data is written to the register of the processor. The microcodes

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for authentication in columns 11 and 12 have intermediate data which are stored securely such that an external program cannot see what is happening in the processor.

Claim 6:

Okada further discloses a cryptography unit comprising a functional unit within said processor for securely executing said key-based cryptographic process internally within said processor (Figures 1 and 5, item 17), wherein said cryptography unit comprises: said digital secret; said cryptography engine; and said internal memory (col 11, lines 1-28 and col 12, lines 15-24, 35-65).

Claim 7:

Okada further discloses wherein said key-based cryptographic process comprises: a key-based encryption process; and a key based decryption process (col 10, lines 15-19, 46-49; col 11, lines 49-54; and col 12, lines 15-19).

Claim 9:

Okada further discloses wherein said digital secret is unique to said processor and is permanently and physically manifested within said processor (col 11, lines 8-10, 23-28; col 9, lines 31-36; and col 12, lines 15-19, 60-65). The examiner is considering the digital secret as comprising the processor id and/or either the secret key or private key in the cited sections. Okada discusses that the processor id is unique to the processor, is assigned during manufacturing, and written to non-volatile memory (col 6, lines 39-42 and col 9, lines 31-36). A digital secret comprising a portion that is unique is also unique. The secret key and private key is also discussed in the cited sections as being stored in the processor, thus the digital secret being a combination of the

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processor id and/or processor key is permanently and physically manifested in the processor since storage is via use of non-volatile memory.

Claim 10:

Claim 10 is a combination of what is recited in claims 1 and 6 and is rejected for the same reasons given therein.

Claim 11:

Claim 11 is similar to what is recited in claim 7 and is rejected for the same reasons given therein.

Claim 14:

Claim 14 recites limitations similar to what is recited in claim 9 and is rejected for the same reasons given therein.

Claim 21:

Okada disclose\$:

1. A secure hardware environment providing core processing functionality (Figures 1 and 5, item 100), wherein said secure hardware environment comprises:
 - a. A secure cryptography unit (Figures 1 and 5, item 17), wherein said cryptography unit internally provides secure cryptographic capabilities as a functional unit within said secure hardware environment (col 9, lines 37-52).

Claim 23:

Claim 23 recites limitations substantially similar to what is recited in claim 1 and is rejected for the same reasons given therein.

Claim 24:

Claim 24 recites limitations substantially similar to what is recited in claim 5 and is rejected for the same reasons given therein.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 13, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada (US 6,704,872) in view of Fahrny (US 2004/0098591).

Claim 8:

Okada further discloses a secure hardware environment providing core processing functionality (Figures 1 and 5, item 100; col 11, lines 23-28; and col 12, lines 60-65).

Okada does not explicitly disclose secure software environment coupled to said secure hardware environment, said secure software environment generating executable instructions that are sent to said secure hardware environment for processing, said secure hardware environment in combination with said secure software environment providing processor capability, and wherein said secure hardware environment is accessible only through said secure software environment.

However, Fahrny discloses a secure software environment coupled to a secure hardware environment (paragraphs 10 and 26), said secure software environment generating executable instructions that are sent to said secure hardware environment for processing (Fig 1 and paragraphs 26-28), said secure hardware environment in combination with said secure software environment providing processor capability, and wherein said secure hardware environment is accessible only through said secure software environment (Fig 1, item 16 and paragraphs 28 and 31).

Note in the cited section of Fahrny that a secure hardware (Fig 1, item 16) authenticates software objects, including a trusted operating system at initialization. Access to any items in the secure hardware has to be done via an authenticated software object, i.e. trusted OS. The combination of authenticated software objects, i.e. secure software environment, along with the secure hardware (Fig 1, item 16) provides processor capability.

At the time applicant's invention was made, it would have been obvious to one of ordinary skill in the art to modify Okada's invention according to the limitations recited in claim 8 in light of Fahrny's teachings. One skilled would have been motivated to do so because Fahrny's teachings would further protect data within a secure hardware, i.e. Okada's secure processor 100, by authenticating software objects prior to allowing the software object access to any data in the secure hardware (Fahrny: paragraph 10). Note that this would further Okada's goal of providing an improved technology to prevent illegal execution of a program which can not be externally monitored or modified (col 3, lines 39-44). By controlling which programs are allowed access to the data

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stored in Okada's processor via Fahrny's teachings, one is more likely to prevent illegal program execution and prevent external monitoring of what is happening inside the processor.

Claim 13:

Claim 13 recites limitations similar to what is recited in claim 8 and is rejected for the same reasons given therein.

Claim 22:

Claim 22 recites limitations similar to what is recited in claim 8 and is rejected for the same reasons given therein.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okada (US 6,704,872) in view of Cmelik et al (US 6,031,992).

Claim 12:

Okada does not explicitly disclose wherein said processor comprises a very long instruction word processor (VLIW) processor. However, Cmelik discloses the limitation (col 8, lines 51-65). At the time applicant's invention was made, it would have been obvious to one skilled in the art to modify Okada's invention according to the limitations recited in claim 12 in light of Cmelik's teachings. One skilled would have been motivated to do so because use of a VLIW processor would increase the speed of processor execution by eliminating the need for each steps each time the target instruction is encountered (Cmelik: col 9, lines 51-65).

Claims 15-17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada (US 6,704,872) in view of Balard et al (US 2004/0025036).

Claim 15:

As per claim 15, Okada does not explicitly disclose a plurality of fusible links to manifest said digital secret by permanently setting a binary state in each of said plurality of fusible links. However, Balard discloses a plurality of fusible links to manifest a digital secret by permanently setting a binary state in each of said plurality of fusible links, i.e. eFuse Array (paragraphs 44-45 and 101).

At the time applicant's invention was made, it would have been obvious to one skilled in the art to modify Okada's invention according to the limitations recited in claim 15 in light of Balard's teachings. One skilled would have been motivated to do so because storing a secret within a fuse array as per Balard's teachings would increase security for Okada's processor since any attempts at observing the secret would result in the destruction of the chip itself (Balard: paragraph 100), thus increasing security for Okada's invention.

Claim 16:

As per claim 16, Okada does not disclose wherein said digital secret comprises a random number that is generated from an HMAC algorithm implemented on testing data associated with fabrication of said IC chip. However, Balard discloses the limitation (Figures 2 and 10). It would have been obvious to one skilled in the art to modify

Okada's invention according to the limitations recited in claim 16 in light of Balard's teachings. One skilled would have been motivated to incorporate Balard's teachings for the same reasons given in claim 15.

Claim 17:

As per claim 17, Balard further discloses wherein said testing data comprises die test data (paragraph 42 and Fig 6). However, neither Okada nor Balard explicitly discloses testing data comprising wafer test data. However, official notice is taken that testing data comprises wafer test data was well known in the art at the time applicant's invention was made. It would have been obvious for one of ordinary skill in the art to include wafer test data within the combination invention of Okada and Balard as said testing data because testing a processor's wafer ensures quality of the processor.

Claim 20:

As per claim 20, Okada does not explicitly disclose wherein said key-based cryptography process comprises a triple data encryption algorithm (TDEA or Triple DES) cryptography process. However, Balard discloses use of triple DES (Fig 10, item 252). It would have been obvious to one skilled in the art to use triple DES as the key-based cryptography process in Okada's invention because triple DES offers a high level of security.

Claims 18-19 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada (US 6,704,872).

Claim 18:

Okada does not explicitly disclose that said secure cryptography unit comprises a fully integrated circuit within said processor. However, cryptographic units being implemented as fully integrated circuits were well known in the art at the time applicant's invention was made. It would have been obvious to one of ordinary skill in the art to modify Okada's invention according to the limitations recited in claim 18. One skilled would have been motivated to do so because use of an integrated circuit for the cryptography engine would result in faster encryption/decryption as cryptography implemented via hardware is typically faster than a software implementation.

Claim 19:

As per claim 19, Okada does not explicitly disclose that said digital secret and said internal memory are fully integrated within said cryptography engine to facilitate communication without requiring a bus and which is not susceptible to malicious attack. However, official notice is taken that functional units with integrated memory holding a secret key was well known in the art at the time applicant's invention was made. Because the components are integrated, a bus is not required for communication between the components. It would have been obvious to one of ordinary skill in the art to modify Okada's invention according to the limitations recited in claim 19. One skilled would have been motivated to do so because use of such an integrated circuit for the cryptography engine would make Okada's processor more secure.

Claim 25:

Claim 25 recites limitations substantially similar to what is recited in claim 18 and is rejected for the same reasons given therein.

Claim 26:

Claim 26 recites limitations substantially similar to what is recited in claim 19 and is rejected for the same reasons given therein.

Conclusion

Note that while the above citations of the art are meant to help applicant in consideration of the art with respect to the recited limitations, applicant should fully review all of the prior art of record since other sections not cited by the examiner could also be pertinent to the recited limitations and other combinations of the prior art of record could also be applicable in rejecting the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ponnoreay Pich whose telephone number is 571-272-7962. The examiner can normally be reached on 9:00am-4:30pm Mon-Fri.

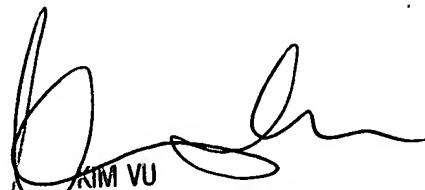
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Vu can be reached on 571-272-3859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Ponnoreay Pich
Examiner
Art Unit 2135

PP



KIM VU
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